STD-DOS 1.21 Systems

and

7390-1
Small Computer Systems Interface (SCSI) Host Adapter

USER'S GUIDE

READ THIS FIRST

A revision change has been made for the Prototyping System PS-1.2 and OEM Systems OS-1.2 and OD-1.2. These systems are now called PS-1.21, OS-1.21, and OD-1.21 respectively. All references in the STD-DOS User's Guide to 1.2 shall be treated as 1.21.

For the STD-DOS PS-1.21/H Prototyping System, read the 7390-1 SCSI Host Adapter User's Guide first. There are differences between the system configuration of PS-1.21, as explained in the STD-DOS User's Guide, and that of the PS-1.21/H system.

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Section 1
STD-DOS 1.21 Systems

Chapter 1
INTRODUCTION

The Small Computer Systems Interface (SCSI) is a high-speed parallel interface that provides host computers with device independence. Disk drives (floppy, hard, optical), tape drives, printers, and communication devices can be added without modifications to system hardware or software.

For the Prototyping System (PS-1.2) and the OEM Systems (OS-1.2 and OD-1.2), a revision change has been made. These systems are now called PS-1.21, OS-1.21, and OD-1.21 respectively. The revision changes the ROM Disk A: sector size from 128 bytes to 512 bytes. This allows for the addition of mechanical drives to the STD-DOS systems. For an explanation of ROM disk sector size, refer to Section 1, Chapter 5 of the STD-DOS User's Guide.

The 7390-1 SCSI Host Adapter Option adds a 20-megabyte Winchester Disk Drive to the STD-DOS PS-1.21 Prototyping System. This is a factory-installed option called the STD-DOS PS-1.21/H Prototyping System. The 7390-1 SCSI Host Adapter can also be added to OS-1.21 and OD-1.21 by the user (see Chapter 2, *Installation*, in this section).

The 7390-1 SCSI Host Adapter Option **replaces two** 128K virtual RAM disks in the PS-1.21 system. The first virtual RAM disk replaced consists of the two 7709-64N Battery-Backed Memory Cards. A 128K portion of the 7712A used as the second virtual RAM disk has been returned to system memory. The system memory has, therefore, been increased to 512K bytes.

The 7390-1 SCSI Host Adapter is a single initiator controller for PS-1.21, OS-1.21, and OD-1.21. With the addition of the 7390 SCSI Host Adapter Option to STD-DOS, hard disk drives can be added to the system. The supported SCSI target device is the Rodime RO 652 Winchester Disk Drive or equivalent.

FEATURES

* **Installation of the 7390-1 SCSI Host Adapter Option allows the Winchester Disk Drive to be accessed with no additional configuration required. A factory-installed device driver file (DISKDRVR.SYS) provided on the Hard Disk Utilities disk has been added to ROM Disk B: for the PS-1.21/H System.**

* **PS-1.21/H is an STD-DOS Microcomputer Prototyping System that includes MS-DOS 3.1 as a ROM-based operating system.**

* **The 7390-1 SCSI Host Adapter is based on the NCR 5380 and its associated hardware to provide all mandatory features of the draft-proposed American National Standard for Information systems -- "SMALL COMPUTER SYSTEM INTERFACE (SCSI)" December 10, 1985 (X3T9l.2 REV 17A).**

* **The Winchester Disk Drive is supplied complete with antivibration mounts for mounting to the card rack.**

* **PS-1.21/H is compatible with the STD-8088 Bus Specification Revision 2.0 and above.**

* **Pro-Log supports its Series 7000 STD BUS cards with a five-year parts and labor warranty.**

SUBSYSTEM COMPONENTS

Hardware

* Rodime RO 652 20-Megabyte Winchester Disk Drive with an embedded SCSI target interface.

* 7390-1 SCSI Host Adapter Card. Provides interface to a Winchester Disk Drive.

* RC712 SCSI Interconnect Cable. Provides an interconnect between the Winchester Disk Drive SCSI target and the 7390 SCSI Host Adapter.

* HBX-12T, a 12-slot card rack with mounted Rodime RO 652 Winchester Disk Drive.

* Switching Power Supply with +5V, +12V, -12V, and connection to the HBX-12T.

Software

* PS-1.21, OS-1.21, and OD-1.21 require an installable device driver to support the 7390 SCSI Host Adapter. The DISKDRVR.SYS device driver has been installed at the factory in ROM Disk B: for the PS-1.21 system.

* Hard Disk Utilities Version 1.0 disk, which includes:

  1. DISKDRVR.SYS, an Installable Device Driver
  2. FORMAT.EXE, for formatting the Winchester drive
  3. PARK.EXE, for storing Winchester heads for disk safety during transportation.

Documentation

* 7390-1 SCSI Host Adapter User's Guide

Optional Components

* Additional STD BUS cards for memory and I/O expansion as required by the application. Refer to the Pro-Log *STD-DOS Brochure* or *Technical Manual and Data Book*.

* STD BUS cards racks, power supplies, and cable assemblies as required by the application. Refer to the *STD-DOS Brochure* or *Technical Manual and Data Book.*

FUNCTIONAL CAPABILITY

The 7390-1 SCSI Host Adapter Option allows the addition of a 20-megabyte 3.5-inch Winchester Disk Drive to the STD-DOS system. The Winchester is simply accessed through STD-DOS as Drive C: for the STD-DOS PS-1.21/H system.

SPECIFICATIONS

Electrical Specifications

PARAMETER	MIN	TYP	MAX	UNIT
7390 SCSI Host Adapter				
Supply Voltage, Vcc	+4.75	+5.00	+5.25	DC V
Supply Current, Icc	--	--	+530	DC mA
Rodime RO 652 Winchester Disk Drive				
Supply Voltage, Vcc	+4.75	+5.00	+5.25	DC V
Supply Ripple, Vcc	--	--	100	mV P-P
Supply Current, Icc	--	+1.05	+1.20	DC Amps
Supply Voltage, +12V	+11.40	+12.00	+12.60	DC V
Supply Ripple, +12V	--	--	100	mV P-P
Supply Current, +12V	--	+0.67	+0.90	DC Amps

Mechanical Specification

The **7390-1 SCSI Host Adapter Card** meets all general mechanical specifications of the *STD Series 7000 and 70C00 Specifications*, Pro-Log document number 111684. This document is included in the *Pro-Log Technical Manual and Data Book*, document number 107855 (February '85 or later version).

The **Rodime RO 652 Winchester Disk Drive** meets the standard 3.5-inch form factor.

Physical Specifications

Height:	1.73 inches maximum
Width:	4.10 inches maximum
Depth:	5.75 inches maximum
Weight:	2.20 pounds

Mounting Requirements

The Rodime RO 652 Winchester Disk Drive can be mounted in a host system in any orientation.

Environmental Specifications

PARAMETER	MIN	TYP	MAX	MIN	MAX	UNITS
7390 SCSI Host Adapter						
Ambient Temperature	0	+25	+65	-40	+75	°C
Humidity	5	–	95[1]	5	95[1]	%RH
Rodime RO 652 Winchester Disk Drive						
Ambient Temperature	+10	+25	+50	-40	+70	°C
Temp. Gradient	–	–	+10	–	2	°C/HR
Humidity	10	–	85[1]	5	90[1]	%RH

[1] Noncondensing
[2] Below Condensation

RODIME RO652 WINCHESTER DISK DRIVE

The drive meets its specified performance while subjected to the following shock and vibration conditions injected through the mounting in any of the three mutually perpendicular axes. Vibrations are sinusoidal and shocks half-cycle sinusoidal waveforms.

Vibration: 1.0g peak acceleration. 10 Hz to 500 Hz.
Shock: 10g peak acceleration of less than 10 ms duration, maximum frequency 2 per second.

Realiability Specification

7390 SCSI HOST ADAPTER

Mean Time Between Failures

MTBF is greater than 38 years.

Drive Life

The minimum drive service life is 36,000 power-on hours. The drive is capable of 10,000 start/stop operations during service life.

Mean Time Between Failures

MTBF is greater than 12,000 power-on hours (POH), where the first 50 POH are excluded.

Chapter 2
INSTALLATION

RODIME RO 652 WINCHESTER DISK DRIVE

The Winchester Disk Drive is mounted in an HBX series card rack via a mounting bracket and is factory installed for PS-1.21/H. The drive is supplied with antivibration mounts and threaded mounting brackets that are used for the installation.

The drive is a 3.5-inch Winchester that can interface to any ANSI X359.2 SCSI (Small Computer System Interface) standard host adapter.

Storage Capacity:	unformatted, 25.5 megabytes formatted, 21.3 megabytes

7390-1 SCSI HOST ADAPTER

The 7390-1 SCSI Host Adapter provides a standard SCSI host adapter interface meeting all mandatory features of the ANSI X3T9.2 specification and providing STD-DOS an interface to fixed-disk drives. In the PS-1.21/H system, the SCSI Installable Device Driver DISKDRVR.SYS has been added to the CONFIG.SYS file and is located on ROM Disk B: as a factory-installed option. For the OS-1.21 and OD-1.21 OEM systems, refer to the STD-DOS User's Guide, Section 1, Chapter 4, *Installable Device Drivers*, to add the DISKDRVR.SYS Device Driver.

RC712 SCSI INTERCONNECT CABLE

The RC712 is a 50-wire ribbon cable that interconnects the 7390 SCSI Host Adapter Card to the Winchester Disk Drive.

* Nine-inch overall cable length
* Contains 50 lines of #28 AWG wire

Chapter 3
OPERATION

DRIVE SELECTION

For the STD-DOS PS-1.21/H system, the 7390 SCSI Host Adapter Option is factory installed and the Winchester Disk Drive has been factory formatted and is accessed as Drive C:.

The PS-1.21/H system is shipped with two virtual ROM disks. Drive A: contains the MS-DOS Operating System and Drive B: contains the installable device driver DISKDRVR.SYS for the SCSI interface, a FORMAT.EXE command for formatting disk drives, and a PARK.EXE command to store the Winchester heads during transportation. These two ROM disks are located on the 7710A card.

The installable device driver DISKDRVR.SYS and the FORMAT command for formatting the Winchester Disk Drive are supplied on the Hard Disk Utilities version 1.0 supplied with the option. A PARK.EXE command is also provided on the Utilities Disk to move the Winchester heads to an inner track. This command is used for disk safety during transportation.

For the OS-1.21 and OD-1.21 systems, the Winchester Disk Drive is accessed as the next drive letter available after all virtual disks have been created. When the 7390 SCSI Host Adapter Option is added to OS-1.21 and OD-1.21, the Winchester Disk Drive is accessed as Drive D: when ROM disk B: is added (generated using the ROMDISK utility and using the empty sockets on the 7710A). See the STD-DOS User's Guide, Section 1, Chapter 5, *ROMDISK Utility*, for further information.

DEVICE DRIVER INSTALLATION

STD-DOS PS-1.21/H allows the user to add new character and block devices to the system through the use of installable device drivers. These are files written by the user that allow DOS to access user-added hardware, such as disk drives or parallel ports. Specifications for these files are given in the DOS Technical Reference.

Installable device drivers are added to the system using the DEVICE command:

```
DEVICE=[d:][directory]filename[.ext]
```

The device command must be included in the CONFIG.SYS file on Drive A: so that DOS loads the driver during startup. Since STD-DOS Drive A: is a virtual ROM disk, no lines can be added to the CONFIG.SYS without generating a new ROM disk. To allow for installable device drivers without doing this, CONFIG.SYS includes the following five lines:

```
DEVICE=C:\DEVICE1
DEVICE=C:\DEVICE2
DEVICE=C:\DEVICE3
DEVICE=C:\DEVICE4
DEVICE=C:\DEVICE5
```

The user can add an installable device driver by downloading the file to the root directory of the Winchester disk Drive C: and renaming the file either "DEVICE1," "DEVICE2," "DEVICE3," "DEVICE4," or "DEVICE5." A new Drive A: is necessary only if more than five installable device drivers must be added. The device driver will be installed and available for use the next time the system is started from reset.

For the STD-DOS OEM systems OS-1.21 and OD-1.21, refer to Section 1, Chapter 4 of the STD-DOS User's Guide for adding installable device drivers. The STD-DOS User's Guide is included in the STD-DOC 1.21 Documentation Package, which is shipped with all prototyping systems, but may be purchased as an option for the OD-1.21 and OS-1.21 systems.

POWER-ON EXECUTION

A batch file can be written for the PS-1.21/H system to execute a program as part of the power-on sequence. The AUTOEXEC.BAT file on ROM disk A: searches Drive C: for a file called "STARTUP" during power-on. If any file called STARTUP is found (it can be either STARTUP.BAT, STARTUP.EXE, or STARTUP.COM), it is immediately executed.

For STD-DOS OEM systems OS-1.21 and OD-1.21, refer to Section 1, Chapter 6 of the STD-DOS User's Guide for Power-On Execution.

CREATING ROM DISK A:

When creating a new ROM Disk A:, the number of bytes-per-sector must be changed to 512. Refer to Section 1, Chapter 5 of the STD-DOS User's Guide for creating a ROM disk.

SCSI CONTROLLER

The 7390-1 SCSI Host Adapter is based on the NCR 5380 and its associated hardware to provide all mandatory features of the draft-proposed American National Standard for Information systems -- "SMALL COMPUTER SYSTEM INTERFACE (SCSI)" December 10, 1985 (X3T9.2 REV 17A).

The NCR 5380 SCSI Interface Controller product and technical description can be found in the "NCR 5380-53C80 SCSI Interface Chip Design Manual" or Advanced Micro Devices' "Am5380 SCSI Interface Controller Product Specification."

DMA/Interrupt Controller

The DMA/INTR Controller PAL senses the SCSI Controller INTR line and generates the STD BUS INTRQ* signal. The PAL monitors the CPU-generated INTAK* and PCI signals. When PCI is asserted, then during the second INTAK* the PAL gates the Interrupt Vector onto the STD BUS. If PCI is not asserted during the second INTAK*, the PAL-generated INTRQ* is removed due to another peripheral device INTRQ*. Upon completion of the second INTAK*, the PAL again asserts the INTRQ* and responds to INTAK*. After the PAL gates the Interrupt Vector onto the STD BUS, the SCSI Controller INTR request input is monitored for removal to guarantee that it will not cause a second INTRQ*.

The second function of the DMA/INTR Controller is to allow the CPU to look like a DMA controller to the SCSI peripheral controller. This is accomplished by setting a bit in a port to enable the DMA mode (DMA_EN). When this bit is set, the SCSI Controller Data Port is memory mapped into a block of memory. The CPU is set up to perform a repeat MOVSW from this block of memory. When a RD* or WR* is performed at these addresses and DRQ is asserted, the PAL Controller generates a DACK* for the duration of RD* or WR*. If the memory block is accessed and a DRQ has not occurred from SCSI

Controller, the PAL generates a WAITRQ* to the STD BUS until the DRQ is asserted.

DATA TRANSFER RATE

When the 8088 CPU programs the 7390 SCSI Host Adapter into DMA mode by setting DMA_EN and performs a REP MOVSW instruction, the maximum data transfer rate is 400K bytes/second.

INTERRUPT VECTOR CONTROL

An Interrupt Vector is performed via I/O port 2C9. When the DMA/INTR Controller PAL gates the Interrupt Vector onto the STD BUS during the second INTAK*, it is this port that is read.

PROM JUMPER

The 7390 SCSI Host Adapter has only one jumper. This jumper is in series with the memory chip-select signal used to enable a PROM and the Data Bus Buffer to the STD BUS. When the jumper is not installed, a pull-up resistor is used to pull up the PROM chip-select, disabling the PROM and Data Bus Buffer for that address range. This jumper is removed for PS-1.21/H, OS-1.21, and OD-1.21.

BIOS Address Range
C4000 - C7FFF

PROM Address Assignment

Quasi-DMA Address Range
ED000 - EDFFF

Quasi-DMA Address Range

I/O PORT ADDRESS	OUTPUT FUNCTION	INPUT FUNCTION
2C0	Current SCSI Data	Current SCSI Data
2C1	Initiator Command	Initiator Command
2C2	Mode	Mode
2C3	Target Command	Target Command
2C4	Current SCSI Bus	Select Enable
2C5	Bus & Status	Start DMA Send
2C6	Input Data	Start DMA Targ. Recv.
2C7	Reset Parity/Intr.	Start DMA Init. Recv.
2C8	---	DMA Enable (DMAEN)
2C9	SCSI ID Setting	---
2CA	---	Interrupt Vector

Port Address Assignment

SCSI ID Switches

A four-SPST side-actuated switch mounted by the card ejector allows for setting an SCSI ID. Only the least significant three of the four switches are used. This allows for settings of 0 to 7. The value read back to the CPU is via a one-of-eight decoder; therefore, settings 0 to 7 correspond to decoded values as follows:

SETTING	VALUE READ
0	01
1	02
2	04
3	08
4	10
5	20
6	40
7	80

SCSI BUS AND TERMINATION

The NCR 5380 SCSI Controller drives the SCSI bus directly via the 50-pin latching transition header connector. The SCSI bus signals are defined in the following:

SCSI SIGNAL	PIN
-DB(0)	2
-DB(1)	4
-DB(2)	6
-DB(3)	8
-DB(4)	10
-DB(5)	12
-DB(6)	14
-DB(7)	16
-DB(8)	18
GROUND	20
GROUND	22
GROUND	24
TERMPWR	26
GROUND	28
GROUND	30
-ATN	32
GROUND	34
-BSY	36
-ACK	38
-RST	40
-MSG	42
-SEL	44
-C/D	46
-REQ	48
-I/O	50

SCSI Bus Signals

The minus (-) preceding the signal name indicates active low as defined in the SCSI specification. All odd pins are GROUND. All signals are terminated with a 220-ohm pull-up and 330-ohm pull-down network.

Chapter 3
SCSI SOFTWARE INTERFACE

SCSI INTERFACE DRIVER

This level of software consists of a general SCSI Command handler. Disk Drives, Tape, Drives, Printers, and other communication devices can be controlled. Almost any SCSI command can be handled with this driver. The SCSI Interface Driver software resides in the installable device driver (DISKDRVR.SYS) and is entered through a single software interrupt, 79H.

The SCSI Interface Driver provides a method of controlling the SCSI interface with four functions. Parameters for these functions must be set up in a Request Block. The Request Block will contain Control and Status information, pointers to a Command Block, and a Data Transfer Buffer. This driver works with any Mandatory, Extended, or Optional command as defined in the SCSI specification. Most Vendor Unique Commands will probably work.

Entry Parameters

The SCSI Interface Driver is entered through a single interrupt vector (INT 79) with a far pointer in registers DX:BX to the SCSI Command Request Block and an Initiator Function code in register AH. The SCSI Command Request Block contains all parameters and pointers needed to perform a single SCSI Driver Function or Command.

SCSI FUNCTION CODES

These are the function codes in register AH that are used to select one of the four SCSI Functions:

00 - Reset SCSI Bus
01 - Execute SCSI Command
02 - Initialize SCSI Bus
03 - Get Device Map

Reset SCSI Bus

This operation is used to reset and reinitialize the SCSI Bus and Device Map. None of the other Command Request block parameters are needed.

Execute SCSI Command

This operation selects an SCSI Target and sends a Command Block pointed to by the COMMAND POINTER parameter to perform one of the standard SCSI commands. The rest of the Command Request Block must be set up as needed for each command.

SCSI UNIT #	- BYTE	->
INITIATOR STATUS	- BYTE	<-
TARGET STATUS	- BYTE	<-
INFO TRANSFER FLAG	- BYTE	->
COMMAND POINTER	- DWORD	->
DATA POINTER	- DWORD	->
TRANSFER COUNT	- WORD	<->

-> = Entry parameter
<- = Returned parameter

Command Request Block

SCSI UNIT # -- This is the local unit number of the selected SCSI Target Device or Device Sub Unit. The DEVICE MAP uses this parameter to calculate the proper SCSI ID code and SubUnit code (LUN).

INITIATOR STATUS -- This is the Initiator Status byte. This byte indicates that the 7390 SCSI Host Adapter is functioning properly. This byte should be checked before the Target Status

byte is checked. If this parameter returns an error, the Target Status byte will not be valid:

00 = No Error
FF = Error

TARGET STATUS -- The Target Status byte is returned from the Target after each SCSI Command has been executed. If the status is CHECK CONDITION, then a REQUEST SENSE command must be executed to get the SENSE KEY error code. Refer to the SCSI specification for STATUS byte and SENSE KEY definitions.

INFO TRANSFER FLAG -- The Information Transfer Flag tells the SCSI Interface Driver that there will be an Information transfer to or from the address specified by the Data Pointer.

00 = Data Transfer
FF = Information Transfer

COMMAND POINTER -- This is a double word pointer to an SCSI Command Block. Refer to the SCSI specification for the format of each command.

DATA POINTER -- This is a double word pointer to the Memory Buffer where the Data or Information is transferred.

TRANSFER COUNT -- For Data transfers, this parameter is the number of sectors or blocks to be transferred to or from the disk. On completion of a Read or Write command, this parameter shall be set to the number of blocks successfully transferred. For Information Transfers, this parameter is set to the number of bytes to be transferred.

INITIALIZE SCSI BUS

This operation initializes any SCSI data buffers. An attempt is made to select each possible SCSI Target. An eight-byte DEVICE MAP is created with device-type information of each SCSI Target found. The DATA POINTER parameter is set to point to the DEVICE MAP. Refer to the SCSI specification under the INQUIRY Command for Device Type Code definitions.

Byte 0 -	DEVICE TYPE CODE	Device 0
Byte 1 -	DEVICE TYPE CODE	Device 1
Byte 2 -	DEVICE TYPE CODE	Device 2
Byte 3 -	DEVICE TYPE CODE	Device 3
Byte 4 -	DEVICE TYPE CODE	Device 4
Byte 5 -	DEVICE TYPE CODE	Device 5
Byte 6 -	DEVICE TYPE CODE	Device 6
Byte 7 -	DEVICE TYPE CODE	Device 7

Device Map

Get Device Map

This operation returns a far pointer to the DEVICE MAP described in the INITIALIZE SCSI function. If the DEVICE MAP has not been initialized, an FF error code is returned in the INITIATOR STATUS location of the Command Request Block.

Chapter 4
REFERENCE DRAWINGS

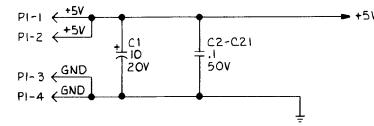
The reference drawings in the following pages are included in this manual FOR REFERENCE USE ONLY. These drawings may differ in some respects from the card you receive from Pro-Log. If you require the specific revision documents of the schematic and assembly for the board shipped, please call Pro-Log Customer Support at (800) 538-9570, extension 3617. In California call (408) 646-3617 from 7 a.m. to 4 p.m. (Pacific Time).

NOTES: UNLESS OTHERWISE SPECIFIED.

1. ALL RESISTOR VALUES ARE IN OHMS, .25W, 5%.
2. ALL RESISTOR PACKS ARE 4.7K, .1W, 5%.
3. ALL CAPACITOR VALUES ARE IN MICROFARADS.
4. FOR R4 AND R5 SEE EXAMPLE FOR INTERNAL CIRCUITRY.
5. U12 AND CONNECTOR J1 NOT INSTALLED.

REVISIONS

DOC REV	DESCRIPTION	DATE	APPR
A	INITIAL RELEASE PER PCN 4117		

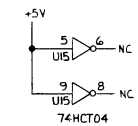


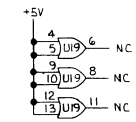
SIGNAL LOCATOR CHART		
SIGNAL NAME	SHEET/ZONE LOCATION	
	SOURCE	DESTINATION
BD0	S2/D7	S2/A6
BMCSYNC	S2/C7	S2/D5
DIR*	S2/A6	S2/D7

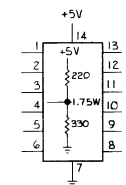
DEVICE TABLE			
REFERENCE DESIGNATION	DEVICE TYPE	POWER PIN	
		GND	+5V
U20	74HCT20	7	14
U19	74HC32	7	14
U14	74HCT74	7	14
U10,11	74HC138	8	16
U8	74HC244	10	20
U9	74HCT374	10	20
U6,7,13	74HCT688	10	20
U15	74HCT04	7	14
U3, 4	74HCT244	10	20
U2	74HCT373	10	20
U1	74LS245	10	20
5 U12	27C64	14	28
U17	PAL16L8A	10	20
U16	5380	11	31
U5	74LS244	10	20
U18	74HCT32	7	14
R4, R5	RES-NET	7	14
R9	RES-NET	—	1

REFERENCE DESIGNATION	
LAST USED	NOT USED
C21	—
J2	—
P1	—
Q2	—
R9	—
S1	—
U20	—
W1	—

SPARE GATES AND RESISTORS







4 TYPICAL RESISTOR TERMINATOR NETWORK
R4 AND R5

NC — R5-8
NC — R5-9
NC — R5-10
NC — R5-11
NC — R5-12
NC — R5-13

ITEM NO.	QTY	DESCRIPTION
		PARTS LIST

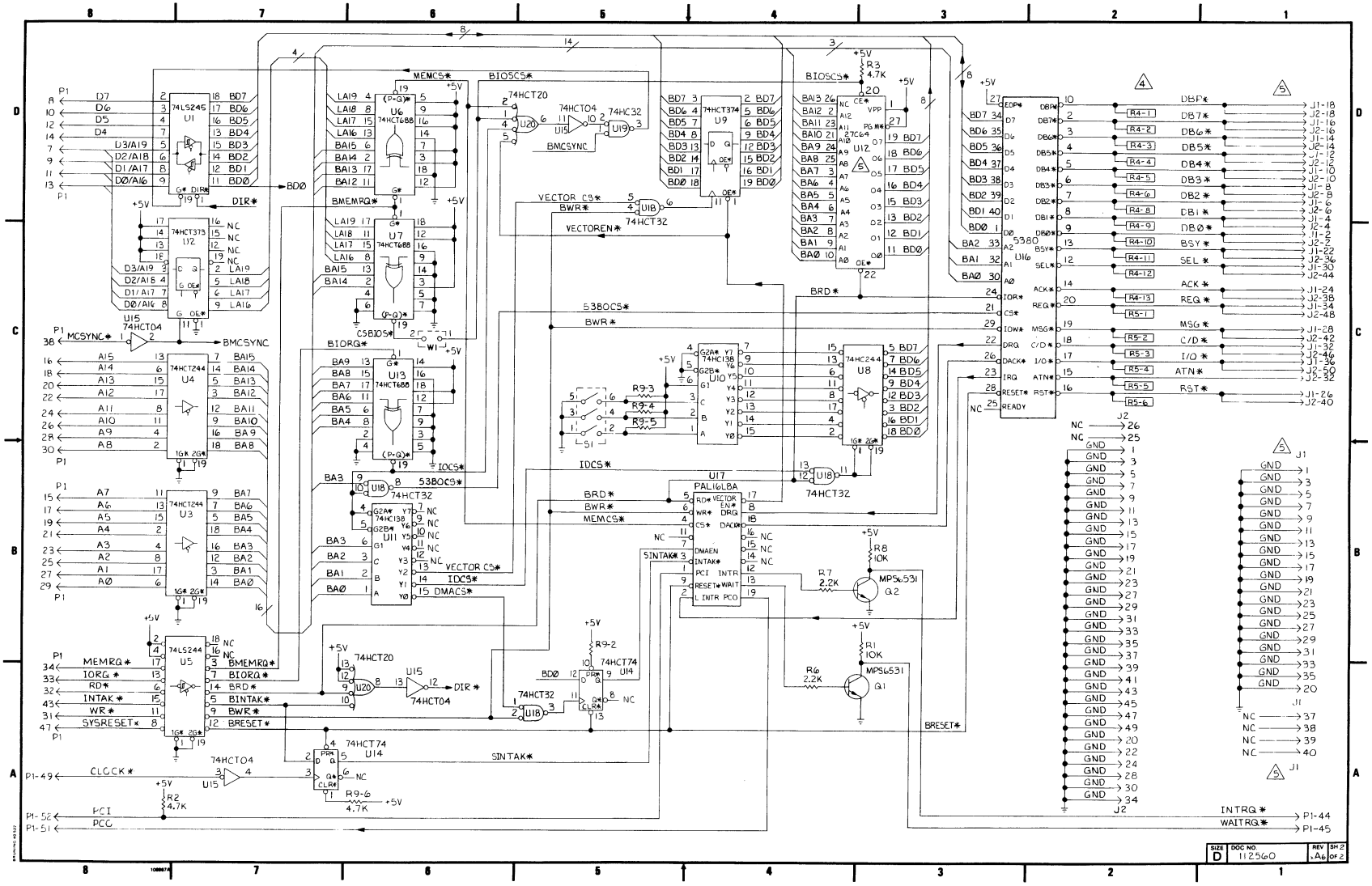
UNLESS OTHERWISE SPECIFIED:
1. DIMENSIONS ARE IN INCHES.
2. BREAK ALL SHARP EDGES.
3. DO NOT SCALE DRAWING.
4. TOLERANCES:
ANGLES ±
XX ±
.XXX ±

PRO-LOG CORPORATION

DRAWN	P.RAMAKUL	DATE 12-28-86
CHECK		DATE
APPR		DATE
SCALE		

TITLE: SCHEMATIC, SCSI CONTROLLER CARD

SIZE	DOC NO.	REV	SH 1
D	112560	x A6	OF 2


74LS245 U1
74HCT373 U12
74HCT688 U6
74HCT688 U7
74HCT688 U13
74HCT04 U15
74HCT244 U4
74HCT244 U3
74LS244 U5
74HCT20 U20
74HC32 U19
74HCT374 U9
27C64 U12
74HCT244 U8
74HC138 U10
74HC138 U11
74HCT32 U18
PAL16L8A U17
74HCT74 U14
5380 U16
MPS6531 Q2
MPS6531 Q1
R3 4.7K
R1 10K
R2 4.7K
R8 10K
R7 2.2K
R6 2.2K
R9-2
R9-3
R9-4
R9-5
R9-6 4.7K
S1
W1
J1
J2
P1
MEMCS*
BIOSCS*
BMEMRQ*
CSBIOS*
BIORQ*
IOCS*
5380CS*
BMCSYNC
VECTOR CS*
VECTOREN*
IDCS*
DMACS*
SINTAK*
BRESET*
PCI
PCC
INTRQ*
WAITRQ*
CLOCK*
DIR*
BDØ
BRD*
BWR*
MEMRQ*
IORQ*
RD*
INTAK*
WR*
SYSRESET*
BMEMRQ*
BIORQ*
BINTAK*
MCSYNC*
DBP*
DB7*
DB6*
DB5*
DB4*
DB3*
DB2*
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